NIOSH Response to Sanford Cohen & Associates Review of Hooker Electrochemical Company TBD *(DCAS-TKBS-0009 Rev. 3)*

Response Paper

National Institute for Occupational Safety and Health

Division of Compensation Analysis and Support

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Background

On November 22, 2016, SC&A delivered a review of revision 3 of the Hooker Electrochemical Company TBD (DCAS-TKBS-0009). The review considered the resolution to findings 4, 5 and 6 of review of revision 2 of the TBD. SC&A recommended closing findings 5 and 6, but had additional concerns for finding 4. This white paper discusses those concerns.

Finding 4 essentially noted that revision 2 of the document did not include ingestion intakes. During a meeting of the URAWE working group held 7/19/2016, NIOSH stated that the Hooker TBD failed to include ingestion but the dose reconstructions have included ingestion intakes utilizing DCAS-TIB-009. NIOSH agreed the discussion should be added to the TBD.

In SC&A's review, they compared the ingestion technique used in TKBS-0009 to that in the DuPont Deepwater Works TBD (TKBS-0006) and raised several concerns. These concerns in part are caused by a misunderstanding of what was discussed in past work group meetings. In order to clarify past discussions and resolve the current concerns, it is necessary to discuss some of the background information first.

Use of TIB-009 during Residual Periods

SC&A indicated there was general agreement that methodology prescribed in TIB-009 was not acceptable for estimating ingestion intakes during the residual period. This is not entirely accurate. TIB-009 correlates ingestion intakes to airborne concentrations that were generated from activities conducted **during the operational period**. During those evolutions, the operation causing the airborne concentration is also causing surface contamination. The surface contamination in turn is related to the ingestion rate so it is possible to correlate airborne concentrations to ingestion rate without the intermittent step of calculating a surface contamination value.

The previous discussion, associated with DuPont, was related to the use of the TIB-009 methodology to estimate ingestion intakes based on resuspended airborne contamination during the residual period. While it may be possible to develop a conversion factor correlating resuspended airborne contamination to ingestion rate, TIB-009 did not do that and NIOSH agrees that it was inappropriate to use it in that manner.

It was also discussed, however, that while the airborne concentrations decrease rapidly after the cessation of operations, there is no reason to believe the same is true of the surface contamination levels. Therefore, there is no reason to believe the ingestion rate is reduced rapidly. It is therefore possible to use TIB-9 with the operational airborne concentrations to determine the ingestion rate at the end of the operational period. Because there is no reason to believe the ingestion rate decreased quickly, it is also appropriate to use this rate at the start of the residual period.

To summarize, the general agreement was that it is not appropriate to use TIB-009 with the resuspended airborne values of the residual period, but it is appropriate to use the operational

period ingestion rate (determined using TIB-009) in the residual period. As SC&A calculations showed, this is what was done in revision 3 of the Hooker TBD.

Inconsistency between NRC ingestion value and TIB-009

SC&A noted that for the DuPont Deepwater Works TBD, NIOSH used an NRC conversion factor of 1.1E-4 m^2/hr to calculate ingestion intakes. This factor comes from NUREG/CR-5512. SC&A compared this to the ingestion rate calculated using TIB-009 and determined the TIB-9 approach was 8.5 times lower.

In order to perform this comparison it was necessary for SC&A to estimate a surface contamination value utilizing the technique in TBD-6000. That technique relies on a conservative default value of 30 days for settling time. The data analysis used to derive that 30 day value calculated the value four different ways, resulting in values of 5.8, 7.1, 15 and 27 days (NIOSH 2009). The 30 day default was chosen as a conservative value by rounding the highest value up. When the issue was raised again (SCA 2013), another analysis indicated the most appropriate value would likely fall between 2.97 days and 4.6 days (NIOSH 2013) but the conservative 30 days was retained as a favorable assumption. These values are in the range of 8.5 times lower than the 30 day settling time used in the TBD-6000 technique. This indicates that there is no demonstrated inconsistency between the ingestion techniques. The inconsistency is actually in the surface contamination estimate because it is based on a very conservative default value. For this situation at least, it would appear that the TIB-009 technique is likely the more accurate approach and the approach using of the NRC value is hampered by the conservative default value used for settling time.

Inconsistency between DuPont Deepwater Works and Hooker TBDs

SC&A implied in its report that the two techniques are inconsistent and NIOSH needs to clarify why one procedure was used for DuPont and a different one for Hooker.

NIOSH attempts to use the best available data in estimating doses. The type of data available differs from site to site causing the most appropriate technique to differ from site to site. These two sites are actually a perfect example of this situation.

As stated earlier, the ingestion rate determined in the operational period is appropriate for use at the start of the residual period since it is not normally expected that the surface contamination would decrease quickly at the end of operations (without some cleanup). Therefore it is appropriate to use TIB-009 at the Hooker plant. This is not the case at DuPont. At the end of operations, the facility was decontaminated by washing as well as sandblasting as much as 0.04 inches of concrete from the surfaces. At the end of the decontamination, a survey was performed indicated all areas were less than 500 dpm/100 cm^2. Therefore, at DuPont, there is a disconnect between the operational period contamination levels and the residual period contamination levels. Moreover, there is measurement data of the contamination levels at the start of the residual period. Since TIB-009 essentially assumes no decontamination, it would not be appropriate to use it for DuPont. Also, with measured contamination levels, it would not be

appropriate nor necessary to model the contamination levels. The technique that would use the best available data would be to use the measured contamination levels with the NRC conversion factor as was done for DuPont.

References

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